

Applicant : Niranjan Damera-Venkata  
Serial No. : 10/698,895  
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Page : 9 of 17

Attorney's Docket No.: 200205808-1  
Amendment dated Oct. 5, 2007  
Reply to Office action dated June 5, 2007

### **Amendments to the Drawings**

The attached Appendix contains replacement and annotated sheets of drawings that include changes to FIGS. 1a, 2, and 3. In FIG. 1a, the lower "+" at block 114 is replaced by a "-". In FIG. 2, the lower "+" at block 114 is replaced by a "-" and the upper left "+" at block 214 is replaced by a "-". In FIG. 3, the lower "+" at block 316 is replaced by a "-".

Appendix:     Replacement Sheet  
                 Annotated Sheet Showing Changes

## Remarks

### I. Status of claims

Claims 1-21 were pending.

Claims 22-25 have been added

### II. Amendments to the drawings

FIGS. 1a, 2, and 3 have been amended to correct certain typographical errors:

- In FIG. 1a, the lower “+” at block 114 is replaced by a “-” in accordance with the equation in ¶ 33, line 5.
- In FIG. 2, the lower “+” at block 114 is replaced by a “-” in accordance with the equation in ¶ 33, line 5. The upper left “+” at block 214 is replaced by a “-” in accordance with the noise transfer function defined in ¶ 21, line 2.
- In FIG. 3, the lower “+” at block 316 is replaced by a “-” in accordance with the bandpass transfer function defined in ¶ 22, line 5.

### III. Amendments to the specification

Paragraph 32 of the specification has been amended to indicate that the modified input value  $u(m)$  is subtracted from the modified output value that is produced from the sum of  $(1 - \alpha)o(m)$  and  $\alpha K(z)o(m)$  in accordance with the noise transfer function defined in ¶ 21, line 2.

### IV. Claim rejections under 35 U.S.C. § 112

The Examiner has rejected claims 4, 11, and 18 under 35 U.S.C. § 112, second paragraph, as being indefinite.

#### A. The Standard for Establishing a *Prima Facie* Case of Indefiniteness under 35 U.S.C. § 112, Second Paragraph

Regarding the compliance of claims with 35 U.S.C. § 112, second paragraph, MPEP § 2173.02 explains that (citations omitted; original emphasis):

The essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

- (A) The content of the particular application disclosure;
- (B) The teachings of the prior art; and
- (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent.

If the language of the claim is such that a person of ordinary skill in the art could not interpret the metes and bounds of the claim so as to understand how to avoid infringement, a rejection of the claim under 35 U.S.C. 112, second paragraph, would be appropriate. However, if the language used by applicant satisfies the statutory requirements of 35 U.S.C. 112, second paragraph, but the examiner merely wants the applicant to improve the clarity or precision of the language used, the claim must not be rejected under 35 U.S.C. 112, second paragraph, rather, the examiner should suggest improved language to the applicant.

The Examiner cannot base a rejection under 35 U.S.C. § 112, second paragraph, on a mere assertion that certain elements are “undefined”. Rather, the Examiner is obligated to establish a proper *prima facie* case of indefiniteness under 35 U.S.C. § 112, second paragraph. In this regard, the Board has stated that:

In rejecting a claim under the second paragraph of 35 U.S.C. 112, it is incumbent on the examiner to establish that one of ordinary skill in the pertinent art, when reading the claims in light of the supporting specification, would not have been able to ascertain

with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims.<sup>1</sup>

Similarly, MPEP § 2173.02 explains that (emphasis added):

If upon review of a claim in its entirety, the examiner concludes that a rejection under 35 U.S.C. 112, second paragraph, is appropriate, such a rejection should be made and an analysis as to why the phrase(s) used in the claim is “vague and indefinite” should be included in the Office action.

B. The Examiner's Rejection

The Examiner's only explanation for the rejection of claims 4, 11, and 18 under 35 U.S.C. § 112, second paragraph, is as follows:

Claims 4, 11, 18 are under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention “...sum to unity,”. Applicant does not define what “dc” is. Correction is needed.

C. The Examiner has not Established a *Prima Facie* Case of Indefiniteness under 35 U.S.C. § 112, Second Paragraph

The entire basis for the Examiner's rejection of claims 4, 11, and 18 is that the term “dc” is not defined in the claim. The Examiner, however, has not explained why one of ordinary skill in the pertinent art, when reading the claims in light of the supporting specification and the prior art, would not have been able to ascertain with a reasonable degree of precision and particularity the particular area set out and circumscribed by the claims.

Thus, the Examiner has not established a *prima facie* case of indefiniteness and therefore the rejection of claims 4, 11, and 18 under 35 U.S.C. § 112, second paragraph, should be withdrawn.

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<sup>1</sup> *Ex parte* Wu, 10 USPQ 2d 2031, 2033 (B.P.A.I. 1989) (emphasis added) (citing *In re* Moore, 439 F.2d 1232, 169 USPQ 236 (C.C.P.A. 1971))

D. In any Event, the Lack of Definition for the Term “dc” Does Not Render Claims 4, 11, and 18 Indefinite

Each of claims 4, 11, and 18 provides a clear warning to others as to what constitutes infringement of the claim. In particular, in the context of the subject matter defined in claims 4, 11, and 18 the term “dc” is used by those skilled in the art to refer to zero-frequency. Therefore, when reading the claims in light of the supporting specification and the prior art, one skilled in the art readily would have understood that the phrase “coefficients of the transfer functions  $H(z)$  and  $K(z)$  sum to unity at dc” in each of claims 4, 11, and 18 means that at dc (or zero-frequency) the coefficients of the transfer functions  $H(z)$  and  $K(z)$  sum to unity.

For this additional reason, the rejection of claims 4, 11, and 18 under 35 U.S.C. § 112, second paragraph, should be withdrawn.

E. Conclusion

For the reasons explained above, the rejection of claims 4, 11, and 18 under 35 U.S.C. § 112, second paragraph, should be withdrawn.

Since none of the claims 4, 11, and 18 has been rejected under any other basis, these claims now are in condition for allowance.

V. Claim rejections under 35 U.S.C. § 102

The Examiner has rejected claims 1-3, 5-10, and 12-21 under 35 U.S.C. § 102(b) over Damera-Venkata (“Color Error Diffusion With Generalized Optimum Noise Shaping”).

A. Independent claim 1

Independent claim 1 has been amended and now recites:

1. An error diffusion halftoning method comprising:  
modifying a current input to produce a modified input,  
wherein the modifying comprises incorporating past quantization errors into the current input;  
quantizing the modified input to produce an output; and

processing the output through a data processing path having a bandpass transfer characteristic, wherein the processing comprises deriving an error value from the modified input and the output and diffusing the error value into future inputs.

The Examiner's sole explanation for the rejection of claim 1 is as follows:

With regard to claim 1, Damera-Venkata and Brian disclose an error diffusion halftoning method comprising: using a quantizer having an input and an output; and using a system having a bandpass characteristic to modify the quantizer input without feeding the quantizer output directly into the quantizer input (see Part 3. Vector Color Error Diffusion and figure 1).

Contrary to the Examiner's statement, however, Damera-Venkata does not disclose "processing the output through a data processing path having a bandpass transfer characteristic, wherein the processing comprises deriving an error value from the modified input and the output and diffusing the error value into future inputs," as now recited in claim 1.

Indeed, Damera-Venkata does not disclose anything whatsoever that would have led one skilled in the art to believe that the disclosed color error diffusion system "processing the output through a data processing path having a bandpass transfer characteristic, wherein the processing comprises deriving an error value from the modified input and the output and diffusing the error value into future inputs," as now recited in claim 1. To the contrary, Damera-Venkata discloses a color error diffusion process in which "the noise is shaped into frequency regions of reduced human color sensitivity" (see Abstract, lines 8-9). In accordance with this process, "Quantization errors are filtered using an *error filter* and fed back to the input in order to shape the quantization noise into frequency regions where humans are relatively less sensitive" (see § 1, first ¶, lines 6-9; original emphasis). In §§ 4 and 5, Damera-Venkata discloses how the error filter is designed to shape the noise in a way that minimizes the visually weighted noise energy. As explained in the Background section of the instant application, it is a well-known fact that high frequency regions are less perceptible to the human visual system (see ¶ 4 of the instant application). Based on this well-known fact of the human visual system one skilled in the art readily would have understood that the response of the system disclosed in Damera-Venkata necessarily must have a high-pass response in order "to shape the quantization noise into

frequency regions where humans are relatively less sensitive" (i.e., the error filter in the Damera-Venkata system must provide a high-frequency transfer characteristic).

For at least these reasons, the rejection of independent claim 1 under 35 U.S.C. § 102(b) over Damera-Venkata should be withdrawn.

B. Dependent claims 2, 3, 5, and 6

Each of claims 2, 3, 5, and 6 incorporates the elements of claim 1 and therefore is patentable over Damera-Venkata for at least the same reasons explained above.

C. Claims 7 and 8

Independent claim 7 recites elements that essentially track the pertinent elements of independent claim 1 discussed above and therefore is patentable over Damera-Venkata for at least the same reasons explained above.

Claim 8 incorporates the elements of claim 7 and therefore is patentable over Damera-Venkata for at least the same reasons.

D. Claims 9, 10, and 12-14

Independent claim 9 recites elements that essentially track the pertinent elements of independent claim 1 discussed above and therefore is patentable over Damera-Venkata for at least the same reasons explained above.

Each of claims 10 and 12-14 incorporates the elements of claim 9 and therefore is patentable over Damera-Venkata for at least the same reasons.

E. Claims 15-17, 19, and 20

Independent claim 15 recites:

15. An article for a processor, the article comprising memory encoded with data for instructing the processor to perform error diffusion halftoning, the error diffusion halftoning including performing quantization, and filtering with an effective bandpass characteristic without using an output of the quantization to directly influence an input of the quantization.

The Examiner's basis for the rejection of claim 15 is essentially the same the basis given for the rejection of claim 1 (see page 4 of the Office action).

Contrary to the Examiner's position, however, Damera-Venkata does not disclose "memory encoded with data for instructing the processor to perform ... error diffusion halftoning including performing quantization, and filtering with an effective bandpass characteristic without using an output of the quantization to directly influence an input of the quantization," as recited in claim 15.

Indeed, Damera-Venkata does not disclose anything whatsoever that would have led one skilled in the art to believe that the disclosed color error diffusion system has "memory encoded with data for instructing the processor to perform ... error diffusion halftoning including performing quantization, and filtering with an effective bandpass characteristic without using an output of the quantization to directly influence an input of the quantization," as recited in claim 15. To the contrary, Damera-Venkata discloses a color error diffusion process in which "the noise is shaped into frequency regions of reduced human color sensitivity" (see Abstract, lines 8-9). In accordance with this process, "Quantization errors are filtered using an *error filter* and fed back to the input in order to shape the quantization noise into frequency regions where humans are relatively less sensitive" (see § 1, first ¶, lines 6-9; original emphasis). In §§ 4 and 5, Damera-Venkata discloses how the error filter is designed to shape the noise in a way that minimizes the visually weighted noise energy. As explained in the Background section of the instant application, it is a well-know fact that high frequency regions are less perceptible to the human visual system (see ¶ 4 of the instant application). Based on this well-known fact of the human visual system one skilled in the art readily would have understood that the response of the system disclosed in Damera-Venkata necessarily must have a high-pass response in order "to shape the quantization noise into frequency regions where humans are relatively less sensitive" (i.e., the error filter in the Damera-Venkata system must provide a high-frequency transfer characteristic).

For at least these reasons, the rejection of independent claim 15 under 35 U.S.C. § 102(b) over Damera-Venkata should be withdrawn.

Each of claims 16, 17, 29, and 20 incorporates the elements of claim 1 and therefore is patentable over Damera-Venkata for at least the same reasons.



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Page : 17 of 17

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F. Independent claim 21

Independent claim 21 recites elements that essentially track the pertinent elements of independent claim 1 discussed above and therefore is patentable over Damera-Venkata for at least the same reasons explained above.

VI. Conclusion

For the reasons explained above, all of the pending claims are now in condition for allowance and should be allowed.

Charge any excess fees or apply any credits to Deposit Account No. 08-2025.

Respectfully submitted,

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